Ordering number : EN 3343A

Monolithic Linear IC



No.3343A

LA7680, 7681

Single-Chip Signal Processor for Color TV Use

Overview

The LA7680 and LA7681 signal processors provide all the components required to decode PAL or NTSC Color television signals. On-chip circuits include VIF, SIF, a video processor, a chroma demodulator, and deflection drivers.
The self-adjusting signal processors support vertical field scanning rates of both 50 and 60Hz, allowing the LA7837 and LA7838 vertical output drivers to maintain a constant picture height.
The LA7681 replaces the LA7680's G-Y output at pin 22 with a color contrast signal for input to a SECAM chroma demodulator. This contrast signal is fixed at the maximum.
The LA7680/7681 is available in 48-pin shrink DIPs.

Features

- Minimized external components
- 48-pin shrink DIP

VIF/SIF
- High-gain VIF amplifier
- Fast-response automatic gain control (AGC)
- No delay between audio input and output
- Muting for both audio and video signals or for audio alone

Video processor
- On-chip two-dimensional differential circuit
- Variable current transfer
- 7MHz bandwidth

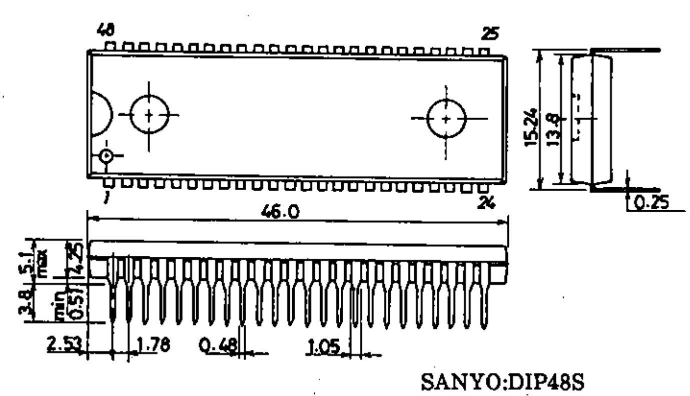
Chroma demodulator
- PAL and NTSC system compatible
- Optimized demodulation angles and ratios
- High performance burst cleaning filter and ACC/killer detector
- On-chip tint circuit (NTSC only)

Deflection drivers
- Adjustment-free vertical or horizontal synchronization
- Two-stage automatic frequency control
- Adjustable separation sensitivity for vertical synchronization
- Fixed picture height for both PAL and NTSC
- Fixed picture height

Package Dimensions

unit:mm

3149



Absolute Maximum Ratings at Ta=25℃

				unit
Input Voltage	V_{13} max		12	V
	V_{11} max		12	V
Input Current	I_{25} max		16	mA
Allowable Power Dissipation	Pd max	Ta≦65℃	1.35	W
FBP Input Current	I_{26} max		5	mA
	I_{24} max		10	mA
FBP Input Voltage	V_{26} min		−5	V
Operating Temperature	Topr		−10∼+65	℃
Storage Temperature	Tstg		−55∼+150	℃

Recommended Operating Conditions at Ta=25℃

			unit
Supply Voltage	V_{13}	9	V
	V_{11}	9	V
Supply Current	I_{25}	13	mA
Operating Voltage Range	V_{13} op	8∼10	V
	V_{11} op	8∼10	V
Operating Current Range	I_{25} op	10∼16	mA

Operating Characteristics at Ta=25℃, Vcc=V_{13}=V_{11}=9V, Icc=I_{25}=13mA

			min	typ	max	unit
[Supply Characteristics]						
Horizontal Supply Voltage	V_{25}		7.0	7.5	8.0	V
Supply Current	I_{11+13}		90	110	140	mA
[VIF Characteristics]fp=38.9MHz						
Video Output Voltage	V_{42}	With no inputs	4.2	4.6	5.0	V
AFT Output Voltage	V_{44}	With no inputs	2.8	4.2	5.7	V
Maximum RF AGC Voltage	V_{46H}	CW=85dBμ, RF AGC VR=min	7.6	8.0	8.3	V
Minimum RF AGC Voltage	V_{46L}	CW=85dBμ, RF AGC VR=max	0	0.01	0.3	V
Input Sensitivity	Vi	VIF input level generating 0.8Vp-p video output with 40% modulation	30	36	42	dBμ
AGC Range	GR	Maximum input(Vo=0.8Vp-p) less input sensitivity	60	68		dB
Maximum Input	Vi max	VIF input level generating +1dB video output	100	107		dBμ
Video Output Amplitude	V_{O42}	Vi=80dBμ, AM=78%MOD	1.7	2.0	2.3	Vp-p
Differential Gain	DG	Vi=80dBμ, 87.5% Video MOD		3.0	10	%
Differential Phase	DP	Vi=80dBμ, 87.5% Video MOD		3.0	10	deg
Video Signal-to-Noise Ratio	S/N	Vi=80dBμ, $20\log\frac{1.43(Vp\text{-}p)}{noise(Vrms)}$	47	53		dB
Sync Signal Tip Level	$V_{42\,TIP}$	CW=80dBμ	2.0	2.3	2.6	V
Frequency Characteristic	fc	Frequency generating -3dB video output	7	10		MHz
VIF Intermodulation	$I_{1.07}$	$V_{4.43MHz}/V_{1.07MHz}$, Vi=80dBμ	35	42		dB

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			min	typ	max	unit
Maximum AFT Output Voltage	V_{44H}	CW=80dBμ, over a range of frequencies	8.0	8.3	8.7	V
Minimum AFT Output Voltage	V_{44L}	CW=80dBμ, over a range of frequencies	0.2	0.4	0.9	V
AFT Detector Sensitivity	Sf	CW=80dBμ, over a range of frequencies	35	60	90	mV/kHz
AFT Defeat Switching Voltage	$V_{AFT\ SW}$	Measured at sweep signal	1.0	5.0		V
Black Noise Threshold	V_{BTH}	Measured at sweep signal	1.2	1.5	1.8	V
[SIF Characteristics]fs=5.5MHz						
SIF Limiting Voltage	Vilim	SIF input level generating -3 dB video output		45	52	dBμ
FM Detector Output Voltage	V_{O1}	Vi=100dBμ, Δf=±30kHz	480	680	880	mVrms
FM Detector Output Distortion	THD	Vi=100dBμ, Δf=±30kHz		0.4	1.0	%
AM Rejection	AMR	Vi=100dBμ, FM:Δf=±30kHz / AM:30%	43	56		dB
AF Amplifier Voltage Gain	G_{AF}	Vi=100mVrms, f=400Hz	18	20	22	dB
Maximum AF Amplifier Output Voltage	V_{O5} max	Output level generating 10% AF amplifier output distortion	2.0	2.8		Vrms
Maximum Attenuation For Electronically Variable Resistors	ATT	Vi=200mVrs, f=400Hz	70	80		dB
[Video Characteristics]						
Video Softener Range	ΔSoft	f=2MHz, 100mVp-p, voltage at video tone variable resistor, 4 to 0V	−6	−4	−2	dB
Video Sharpener Range	ΔSharp	f=2MHz, 100mVp-p, voltage at video tone variable resistor, 4 to 9V	7	10	13	dB
Video Voltage Gain	GV	f=100kHz, 100mVp-p, voltage at contrast variable resistor 9V, voltage at video tone variable resistor 4V	17	20	23	dB
Contrast Control Center Setting	C_{CEN}	f=100kHz, 100mVp-p, voltage at contrast variable resistor 6V	0.45	0.57	0.69	Vp-p
Contrast Control Range	ΔCv	f=100kHz, 100mVp-p, voltage at contrast variable resistor 3 to 9V	20	22	24	dB
Brightness Control	BR_H	Voltage at brightness variable resistor 2V	5.8			V
	Br_{CEN}	Voltage at brightness variable resistor 4.5V	2.6	3.1	3.6	V
	BR_L	Voltage at brightness variable resistor 7V			1.2	V
Video Frequency Characteristic	fV	Voltage at contrast variable resistor 6V, voltage at video tone variable resistor 4V, 3 dB down	5	7		MHz
Direct Current Transfer Rate	R_{DC}	200mVp-p staircase input	88	93		%
[PAL/NTSC Chroma Characteristics]						
Color Control Chrominance Residue	Ec min	Voltage at color variable resistor 0V, voltage at color contrast variable resistor 9V			30	mVp-p
LA7680 Color Contrast Range	ΔCc	Voltage at color variable resistor B-Y=2.5Vp-p, voltage at contrast variable resistor: 3 to 9V	18.5	20	21.5	dB
LA7681 Color Contrast Output Voltage	Vcout	Voltage at color variable resistor 4.5V, voltage at contrast variable resistor 6V	5.8	6.0	6.1	V
Demodulator Output DC Voltage	V_{C-Y}	For burst signals only. Voltage at color variable resistor 0V	4.7	5.2	5.7	V
Demodulator Output DC Voltage Difference	$ΔV_{C-Y}$	For burst signals only. Voltage at color variable resistor 0V	−300	0	300	mV
Demodulator Output Carrier Leakage Voltage	Ecar				0.3	Vp-p
APC Pull-in Range	$Δf_{APC}$		±500			Hz

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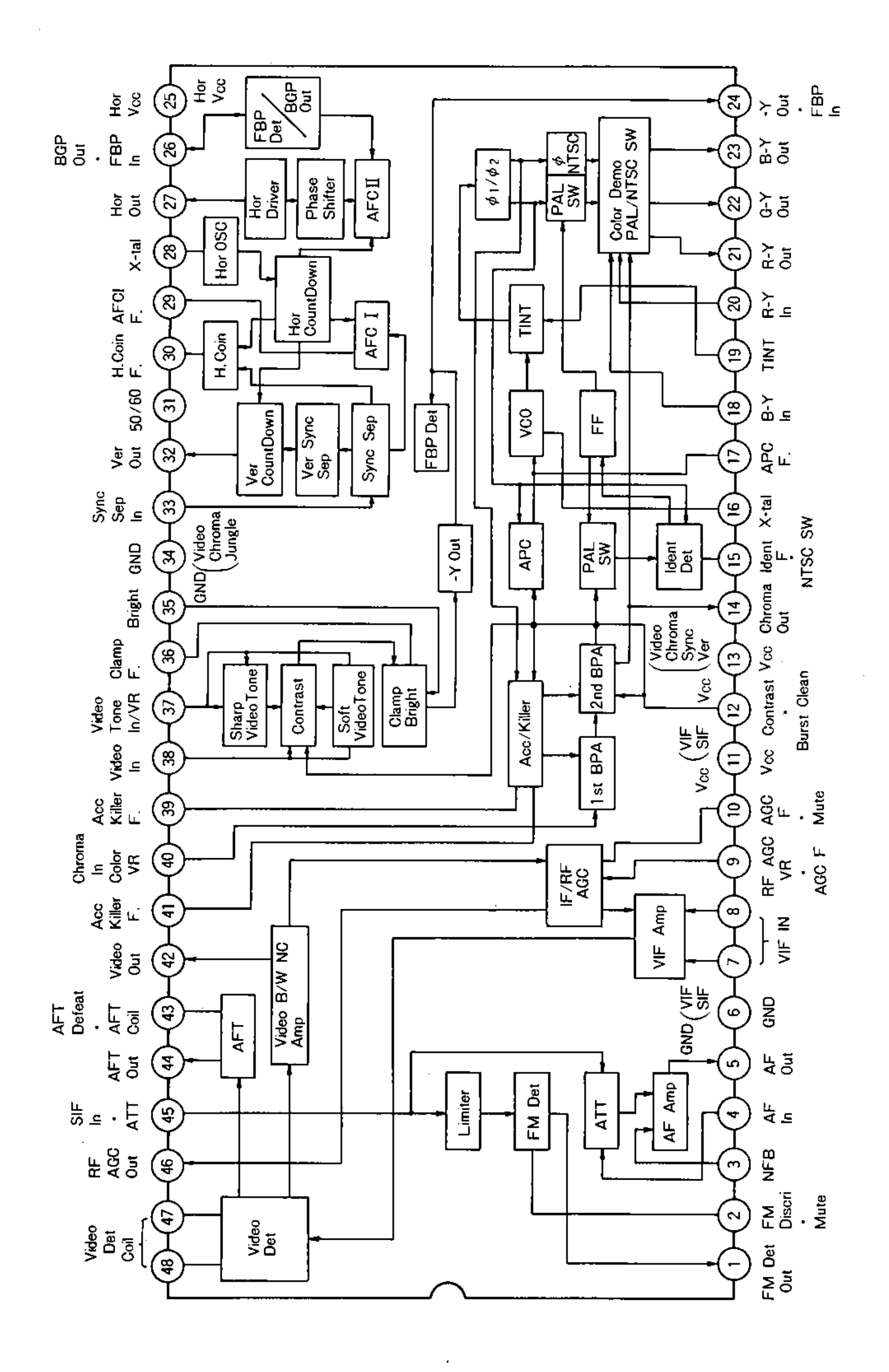
			min	typ	max	unit
[PAL Chroma Characteristics]						
Contrast Control Center Setting	Ec cen	Voltage at color variable resistor: 4.5V (LA7680)	1.0	1.5	2.0	Vp-p
		Voltage at contrast variable resistor: 6V (LA7681)	1.9	2.6	3.3	Vp-p
ACC Amplitude Characteristic	ACCM1p	+6 dB	−3	0	+3	dB
	ACCM2p	−20dB	−5	−1	+1	dB
Demodulator Output Ratios	B/Rp	(Common to both LA7680 and LA7681)	1.50	1.78	2.00	
	G/Rp	With no B-Y signal(LA7680 only)	−0.56	−0.51	−0.46	
	G/Bp	With no R-Y signal(LA7680 only)	−0.21	−0.19	−0.17	
Demodulation Angle	∠RBp		85	90	95	deg
Maximum Chrominance Output	Ech	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	1.0	1.5	2.0	Vp-p
Maximum Demodulator Output	Ecmax	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	3.4	4.0		Vp-p
Killer Trigger Point	Ekonp		−35	−31	−27	dB
[NTSC Chroma Characteristics]						
Contrast Control Center Setting	Ec cenN	Voltage at color variable resistor 4.5V (LA7680)	0.7	1.1	1.5	Vp-p
		Voltage a contrast variable resistor 6V (LA7681)	1.3	1.8	2.3	Vp-p
ACC Amplitude Characteristic	ACCM1N	+6 dB	−3	0	+3	dB
	ACCM2N	−20dB	−5		+1	dB
ACC Phase Characteristic	ACCP1N	+6 dB	−3	0	+3	deg
	ACCP2N	−20dB	−7		+7	deg
Tint Control Center Setting	TCEN	Voltage at tint variable resistor 4.5V, Voltage at color variable resistor 4.5V, Voltage at contrast variable resistor 6V	−9	+3	+15	deg
Tint Range	ΔT	Voltage at tint variable resistor 0 to 4.5 to 9V, Voltage at color variable resistor 4.5V, Voltage at contrast variable resistor 6V	±40			deg
Demodulator Output Ratio	R/BN		0.81	0.90	0.98	
	G/BN	(LA7680)	0.24	0.3	0.38	
Demodulator Angle	∠RBN		90	96	102	deg
	∠GBN	(LA7680)	−131	−121	−111	deg
Killer Trigger Point	EkONN		−38	−34	−30	dB
Maximum Demodulator Output	EcmaxN	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	2.8	3.4		Vp-p
[Deflection Characteristics]						
Synchronization Separator Input Voltage	VSDC		6.0	6.3	6.6	V
Vertical Free-Running Frequency (50Hz)	TVfree50			312.5		H
Vertical Free-Running Frequency (60Hz)	TVfree60			262.5		H
Maximum Vertical Synchronization Frequency (50Hz)	TV max50	With horizontal synchronization signal only		357		H
Maximum Vertical Synchronization Frequency (60Hz)	TV max60	With horizontal synchronization signal only		297		H
Minimum Vertical Synchronization Frequency (60Hz)	TV min60			225		H
Minimum Vertical Synchronization Frequency (50Hz)	TV min50			269		H
Vertical Blanking Pulse Level	VH VBL		7.0	7.5		V
Vertical Blanking Pulsewidth (50Hz)	PWBLK50			21.5		H

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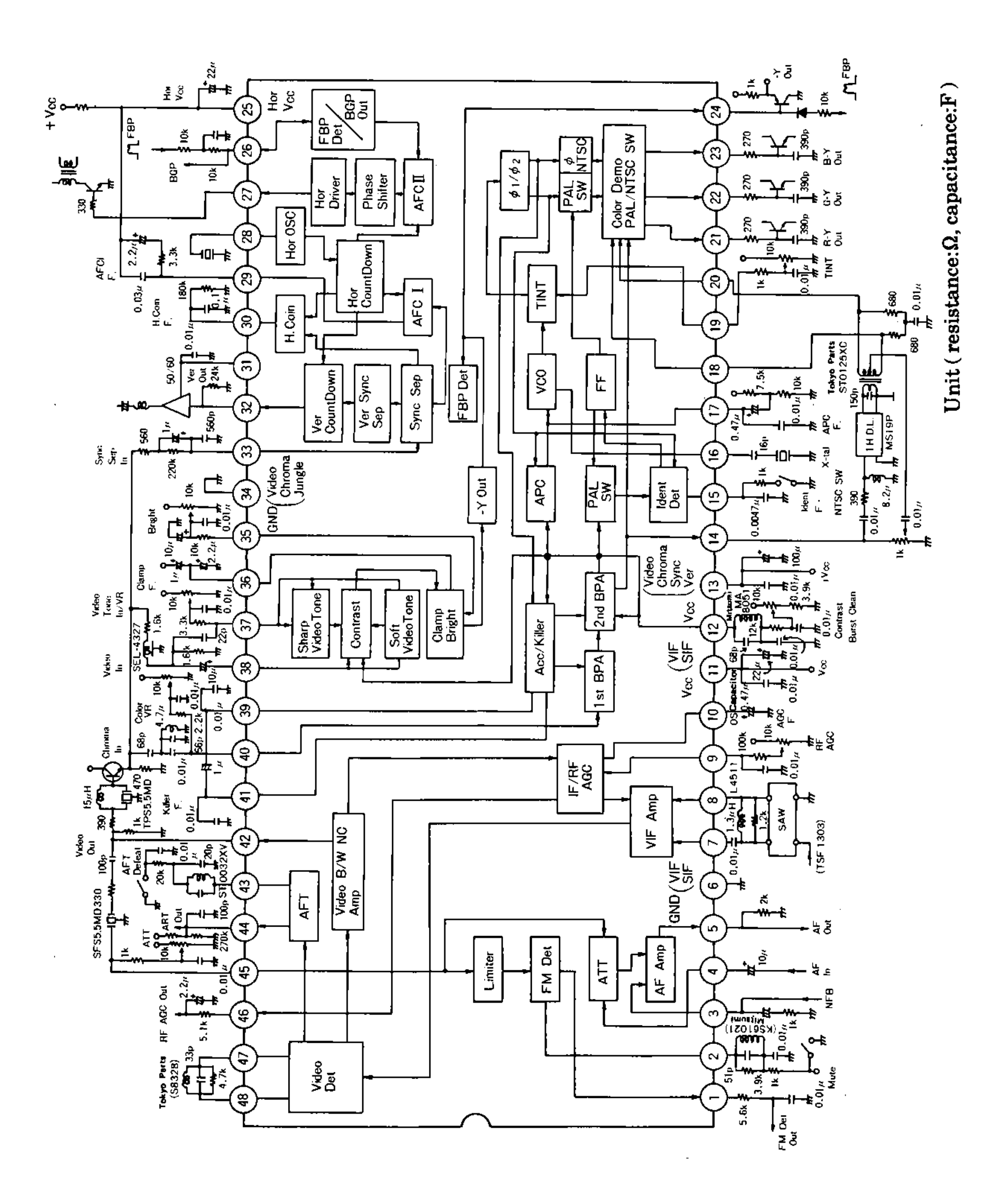
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Vertical Blanking Pulsewidth (60Hz)	P_{WBLK60}			17.5		H
Vertical Output Pulsewidth	$P_{W\,VOUT}$			8.5		H
Vertical Output Voltage	$V_{OUT\,H}$		5.7	6	6.3	V
	$V_{OUT\,M}$		4.3	4.6	4.9	V
	$V_{OUT\,L}$				0.3	V
Vertical Deflection External Trigger Load Impedance	R_{TR}		2.5	3.6		kΩ
Vertical Deflection Automatic Synchronization Cutoff Voltage	V_{SAS}			1.9	2.4	V
Vertical Output Pulse Vcc Starting Level	S_{VV}				4	V
Horizontal Free-Running Frequency Deviation	ΔfH	Deviation from 15.680kHz	−100	0	100	Hz
Horizontal Free-Running Frequency Dependence on Vcc	ΔfHVcc	V_{25}=6.6V (reference value)		2		Hz
Horizontal Pull-in Range	fH PULL	Deviation from 15.680kHz	±450			Hz
Horizontal Output Pulse Vcc Starting Level	SH_V			4.3	5	V
AFC II FBP Peak Level	FBP_H		4.1	4.6	5.1	V
VCR Switch Input Level	VCR			1.3	2.0	V
Horizontal Output Pulsewidth	P_{WHOUT}		21.8	23.8	25.8	μs
Horizontal Output Pulse Phase	H_{PF}		12			μs
	H_{PCEN}		3.4	4.4	5.4	μs
	H_{PR}				0	μs
Burst Gate Pulsewidth	P_{WBGP}		2.7	3.7	4.7	μs
Burst Gate Pulse Phase	Td_{BGP}		0.2	0.6	1.2	μs
Horizontal Synchronization Detector Threshold Level	Hcoin		4.2	4.5	4.8	V
50/60Hz, Output Voltage	V_{50}			0.4	0.5	V
	V_{60}		2.8	3.5		V
50/60Hz, Input Voltage	Vin_{60}				8.7	V
	Vin_{50}		0.15			V

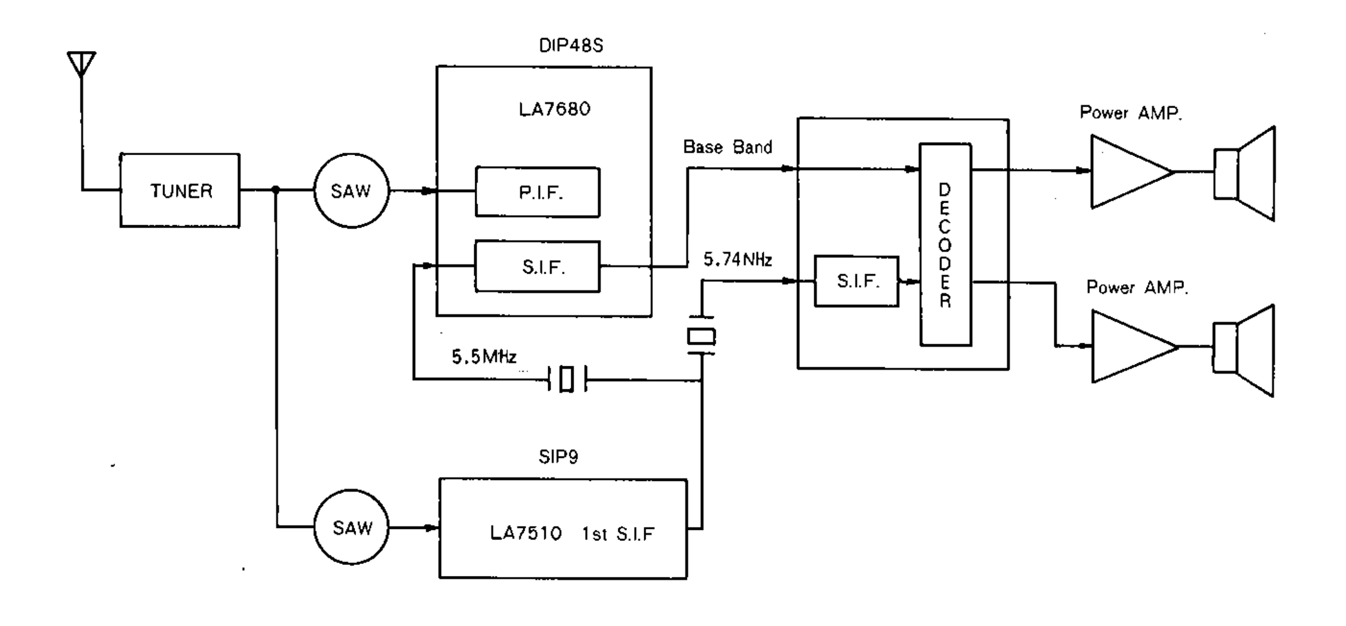
Block Diagram: PAL/NTSC System



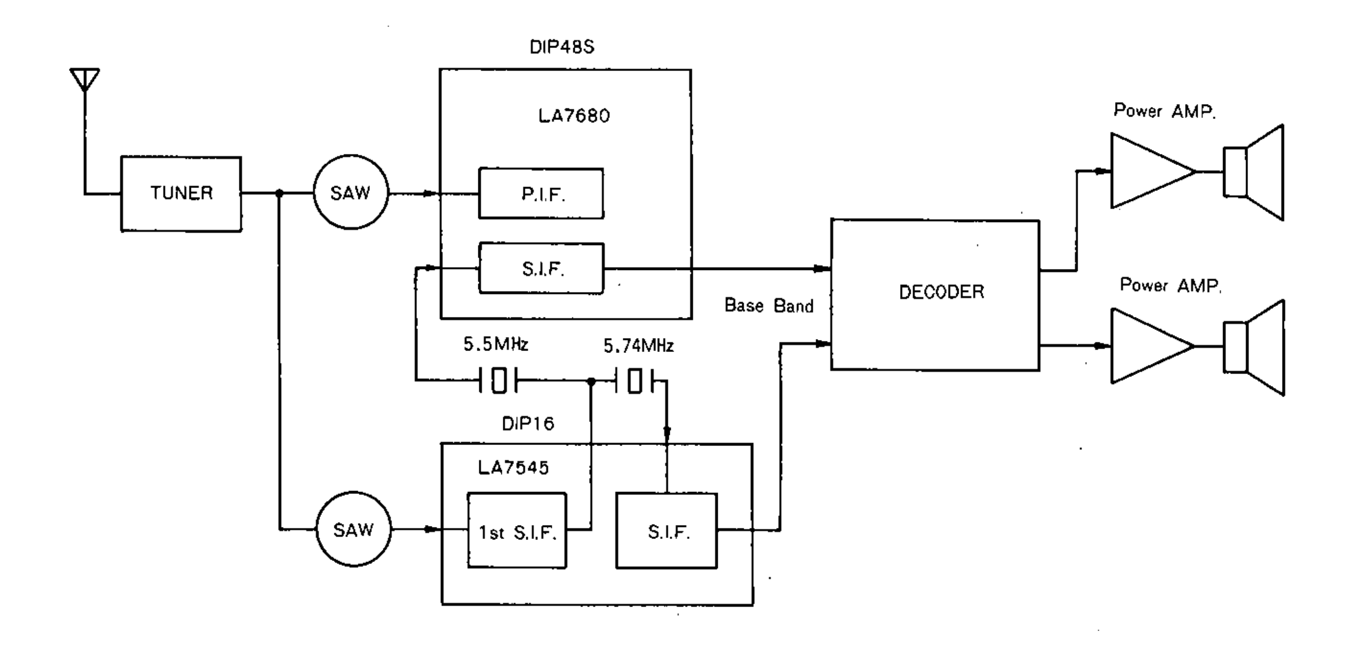
Sample Application Circuit: PAL/NTSC System



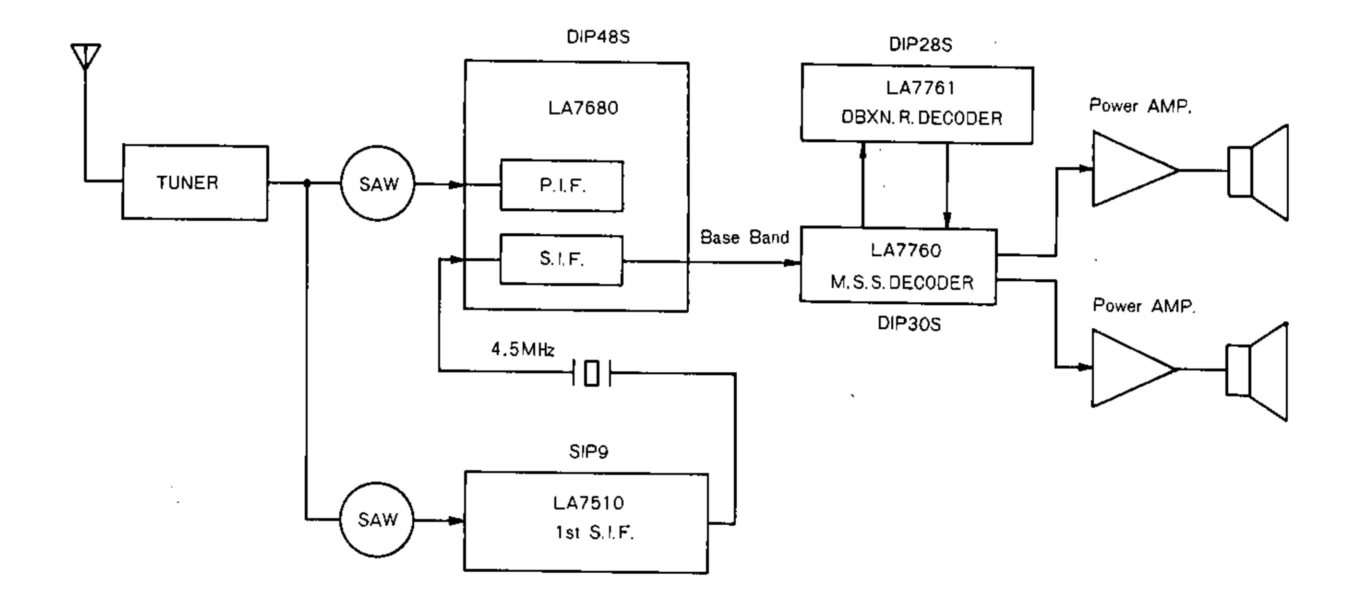
PAL Multi-sound System



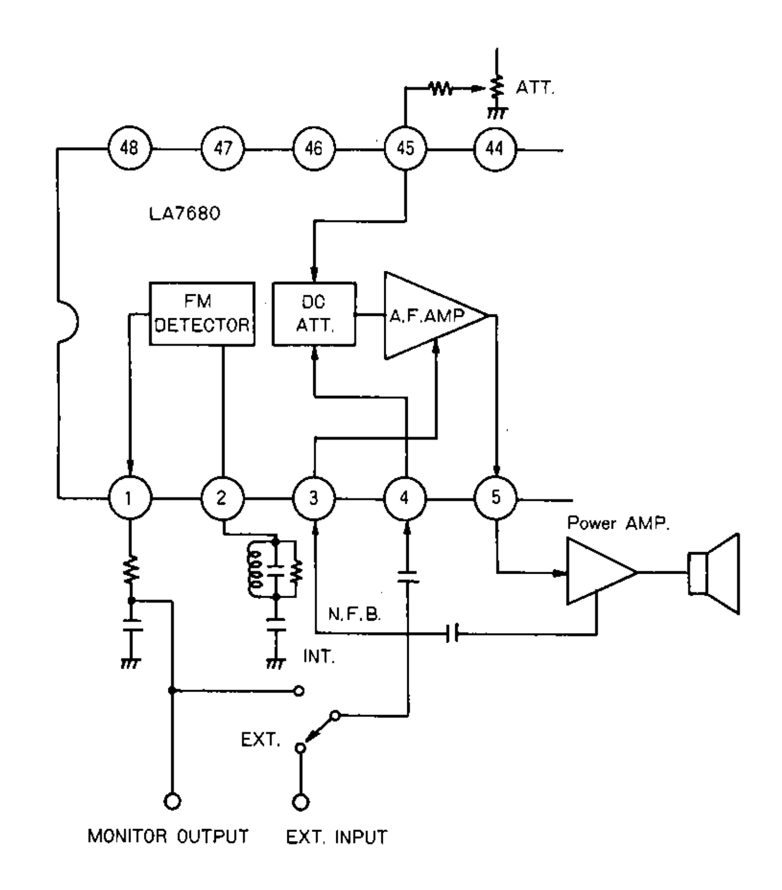
PAL Multi-sound System



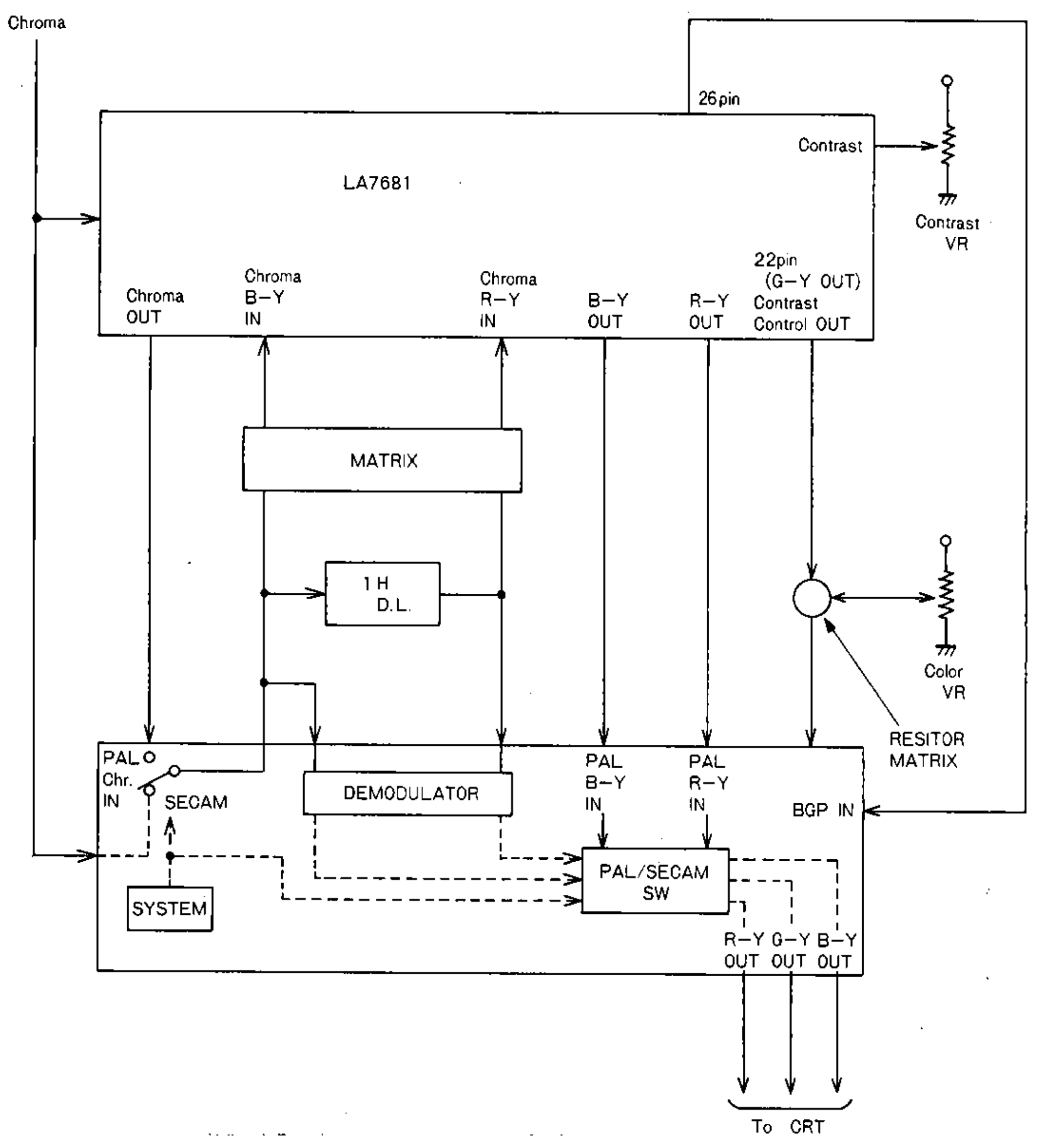
U.S. Multi-sound System



Sound Input/Output



PAL/SECAM Chroma Demodulator Interface



Note: The LA7680 may be used with the transcode type of SECAM chroma demodulators.

This catalog provides information as of June, 1996. Specifications and information herein are subject to change without notice.